

***Brachyloma stenolobum* (Ericaceae: Styphelioideae: Styphelieae), a new,
white-flowered species for Western Australia**

Michael Hislop¹ and Ray J. Cranfield²

¹Western Australian Herbarium, Department of Parks and Wildlife,
Locked Bag 104, Bentley Delivery Centre, Western Australia 6983

²c/o Western Australian Herbarium. Postal address: Science Division,
Department of Parks and Wildlife, Locked Bag 2,
Manjimup, Western Australia 6258

Abstract

Hislop, M. & Cranfield, R.J. *Brachyloma stenolobum* (Ericaceae: Styphelioideae: Styphelieae), a new, white-flowered species for Western Australia. *Nuytsia* 24: 255–261 (2014). A new member of *Brachyloma* Sond. sect. *Lissanthoides* Benth. is described and illustrated. Two keys are presented: an interim key to the Western Australian species of *Brachyloma*, and an Australia-wide key to the species of sect. *Lissanthoides*. The presence of two lineages in the genus, distinguished by molecular phylogenetics and morphology, is discussed, and the case for future elevation of sect. *Lissanthoides* to generic status is examined.

Introduction

Brachyloma Sond. sect. *Lissanthoides* Benth. was thought to be an entirely eastern Australian grouping when in 2002 a previously unknown epacrid from the Forrestania area in Western Australia was collected and tentatively assigned to the genus *Brachyloma* under the phrase name *B. sp. Forrestania* White (M. Hislop & F. Hort MH 2591). A sample for DNA analysis was forwarded to Chris Quinn, who was then a Research Associate at the National Herbarium of New South Wales, studying phylogenetic relationships within the tribe Styphelieae Bartl. Analysis of DNA sequence data from the *matK* region of the chloroplast genome (unpublished data) grouped *B. sp. Forrestania* White in a clade with the eastern Australian species *B. daphnoides* (Sm.) Benth. (from sect. *Lissanthoides*), and, rather unexpectedly, the Western Australian *Astroloma baxteri* DC. Several red-flowered western species (i.e. members of the type section), together with *B. ericoides* (Schltdl.) Sond. and *B. scortechinii* F.Muell. formed a separate clade, but the relationship between the two clades was unresolved.

Research undertaken during a recently completed PhD project (Puente-Lelièvre 2013) has confirmed a close relationship between *B. sp. Forrestania* White, *A. baxteri* and the eastern Australian species currently assigned to sect. *Lissanthoides*. The individual chapters of the above thesis are to be published as separate papers and the first of these will include the transfer of *A. baxteri* to *Brachyloma* (C. Puente-Lelièvre pers. comm.) The current paper provides a formal name for *B. sp. Forrestania* White and reviews the case for the elevation of sect. *Lissanthoides* to generic level.

Methods

This study was based on an examination of dried specimens housed at PERTH. Additional examples of all eastern Australian members of the genus were obtained on loan from CANB.

Foliar measurements were taken from dried specimens. Leaf thickness was measured at the midrib half way along the lamina. Care was taken to confine observations to mature leaves. Inflorescence length was measured from the point of attachment at the axil to the apex of the bud rudiment. Floral measurements were taken from rehydrated flowers in natural posture.

Notes on the circumscription of *Brachyloma*

Bentham (1868) recognised two sections within *Brachyloma*. His typical section (referred to as sect. *Lobopogon* (Schltdl.) Benth. *nom. illeg.*) comprised *B. preissii* Sond. (the type species for the genus), *B. concolor* F.Muell. ex Benth. *nom. illeg.* from Western Australia and the eastern species *B. ericoides* (the type of *Lobopogon* Schltdl.). Section *Lissanthoides* Benth. comprised three eastern species, *B. ciliatum* (R.Br.) Benth., *B. daphnoides* and *B. depressum* (F.Muell.) Benth. In their wide-ranging morphological study into relationships within Styphelieae, Powell *et al.* (1997) proposed the recognition of three genera within *Brachyloma* s. lat. One of the two segregate genera corresponded with Bentham's sect. *Lissanthoides* and the other, conceived as monotypic, was based on *B. scortechinii*. On its own, however, the morphological case that was presented appeared less than compelling and, in the absence at that time of any molecular data, the proposed changes were never effected.

Although primarily focussed on relationships within the *Styphelia* Sm.–*Astroloma* R.Br. clade, the recently completed study by Puente-Lelièvre (2013) also included the most comprehensive molecular sampling yet undertaken in the genus *Brachyloma*, both in terms of the range of species sampled and the number of molecular markers employed (the study was based on four chloroplast and one nuclear loci). Parsimony and Bayesian analyses of the combined molecular data produced a phylogenetic tree which gave strong support for a sister relationship between the two sections of *Brachyloma*. However the results were still not entirely conclusive. The anomalous *B. scortechinii* was not included in this study and so the molecular basis for the position of that species within sect. *Brachyloma* rests on the unpublished data obtained from a single genomic region (C. Quinn pers. comm.). In addition, some support values for the topology obtained within sect. *Brachyloma* were low and, in particular, the position of *B. ericoides* within the section was unresolved.

Notwithstanding the occasional presence of some anomalous features, as noted below, species published since Bentham's (1868) treatment, as well as others currently recognised by informal names only, can be readily placed in either sect. *Brachyloma* or sect. *Lissanthoides*.

The morphology of the corolla lobes provides the most important characters by which the two sections can be distinguished. Members of sect. *Brachyloma* have ovate or broadly ovate corolla lobes which are obtuse or occasionally subacute and with adaxial surfaces that are flat and either completely glabrous or very minutely papillose, with the papillae only observable under magnification (*B. ericoides* is atypical in having a discrete patch of spreading hairs towards the centre of the lobes). In sect. *Lissanthoides* by contrast the lobes are narrowly triangular to narrowly ovate, acute to acuminate, and distinctly papillate or shortly hairy. The adaxial surfaces are keeled or otherwise thickened for part of their length. The latter character is particularly significant and apparently represents a synapomorphy for sect. *Lissanthoides*.

Another important point of difference between the two sections is to be found in the inflorescence character. Whereas members of the typical section have inflorescence axes with bracts present below the bracteole pair, the axis is bare in this region in species from sect. *Lissanthoides*. *Astroloma baxteri* however is a clear exception in this regard having numerous bracts below the bracteoles. While *B. scortechinii* has axis bracts in common with other species from sect. *Brachyloma*, uniquely in the genus it also has flowers that are pedicellate above the bracteoles in the manner of the genus *Lissanthe* R.Br.

With a couple of exceptions there is also a difference in flower colour, with species from the typical section having red flowers and those of sect. *Lissanthoides* white or cream, occasionally with some pink tinges. In Quinn's unpublished analysis *B. scortechinii* grouped with members of the typical section, but is alone in that group in having green flowers. Similarly the red flowers of *A. baxteri* make it atypical within sect. *Lissanthoides*. The latter is also the only species in the genus with basal, rather than apical, hair tufts in the corolla tube, these issuing from well-differentiated appendages. Together with the large corolla size this explains its original placement in *Astroloma*. In the detail of the corolla lobe morphology, however, *A. baxteri* is very comparable with other members of sect. *Lissanthoides*. It is noteworthy in relation to these colour differences between the sections that rare, white-flowered morphs of *B. ericoides* and *B. concolor* have been recorded.

While the molecular case for the elevation of sect. *Lissanthoides* to generic level has been strengthened as a result of the recent research (see above), the addition of a few more species to the dataset should resolve any remaining doubts regarding the sister status of the two sections. The morphological case, as outlined above, is supportive of the recognition of a second genus.

Taxonomy

Interim key to the Western Australian species of *Brachyloma*

1. Corolla red or white, lobes narrowly triangular, acute, adaxially keeled in the upper half, strongly papillate or shortly hairy, at least about the keel
 2. Corolla red, the tube >10 mm long; hairs arising from five appendages inserted close to the base of the corolla tube (southern forests and near south-coastal localities between Lake Muir and Fitzgerald River) ***Astroloma baxteri***
 - 2: Corolla white, the tube to 1.6 mm long; appendages absent, hairs reflexed into the tube from the lobe bases (Forrestania area) ***B. stenolobum***
- 1: Corolla red, lobes ovate or broadly ovate, usually obtuse, occasionally subacute, adaxial surface flat, appearing glabrous, but usually minutely papillose under magnification
 3. Anthers fully or partially included within the corolla tube; filaments apparently absent or very short, the free portion to *c.* 0.3 mm long, \pm terete in section or too short to interpret
 4. Leaves flat or adaxially convex, less often adaxially concave, if convex then the margins not prominently recurved and the abaxial surface always visible, apex long-mucronate and sharply pungent; sepals at least 2 mm long
 5. Leaf margins coarsely ciliolate with stiff hairs 0.08–0.20 mm long; style poorly differentiated from ovary apex, to 0.6 mm long; corolla appendages >2 mm long; drupe globose, about as long as wide (Kalbarri area) ***B. pirara* ms¹**

- 5: Leaf margins usually with minute projections to *c.* 0.02 mm long or occasionally \pm smooth; style well-differentiated from ovary apex, at least 1 mm long, usually longer; corolla appendages *c.* 1.5 mm long; drupe depressed-globose, much wider than long (Kalbarri area) **B. djerral ms¹**
- 4: Leaves always strongly convex adaxially, the margins recurved or revolute, partially obscuring the abaxial surface in some or all leaves, apex short- or long-mucronate, but not or scarcely pungent; sepals to 1.5 mm long, but usually less
- 6: Longest leaves to *c.* 8.0 mm long, including petiole, abaxial surface with deep, narrow grooves (Kulin area) **B. delbi**
- 6: Longest leaves to *c.* 5.5 mm long, including petiole, abaxial grooves shallower and wider than above (Newdegate–Forrestania–Cascade)..... **B. nguba**
- 3: Anthers fully exerted from corolla tube; filaments concavo-convex or less often plano-convex in section, fleshy, tapering at both ends, the free part at least 1 mm long, usually longer
- 7: Leaves adaxially concave **B. geissoloma ms s. lat.^{2,3}**
- 7: Leaves adaxially convex, usually with recurved margins or sometimes flat **B. preissii s. lat.³**

¹*Brachyloma djerral* and *B. pirara* are manuscript names to be published in the near future by the second author.

²*Brachyloma geissoloma* (F.Muell.) Cranfield ms, is to be published in the near future, replacing the invalidly published name, *B. concolor*.

³*Brachyloma preissii* and *B. geissoloma* ms form the core of a difficult species complex which is still under taxonomic review. It includes the published species *B. mogin* Cranfield and potentially eight additional taxa. These are currently recognised on Western Australia's vascular plant census (Western Australian Herbarium 1998–) by the following manuscript names: *B. ericoides* subsp. *occidentale* ms, *B. geissoloma* subsp. *collinum* ms, *B. geissoloma* subsp. *ovatum* ms, *B. jillup* ms, *B. moolya* ms, *B. preissii* subsp. *lanceolatum* ms, *B. preissii* subsp. *obtusifolium* ms and *B. tamminense* ms.

Key to the species of *Brachyloma* sect. *Lissanthoides* (adapted from Albrecht 1996)

1. Corolla red, tube at least 10 mm long; five hairy appendages inserted close to the base of corolla tube (WA)..... **Astroloma baxteri**
- 1: Corolla white, occasionally with some pink tinges, tube to *c.* 6 mm long; reflexed tufts of hair arising from the top of the corolla tube or base of corolla lobes, or reflexed hair tufts absent
2. Reflexed hair tufts arising from the base of the corolla lobes; inflorescence axis terminating in bud-rudiment, bracteoles subtended by a fertile bract with 1 or 2 smaller bracts towards base of axis; ovary 3-locular (WA)..... **B. stenolobum**
- 2: Reflexed hair tufts arising from top of corolla tube, or reflexed hairs absent; inflorescence axis apparently terminating in a flower, bracts absent, axis bare below the bracteoles; ovary usually 5-locular (3–5-locular in *B. depressum*)
3. Reflexed hair tufts absent from corolla tube (NSW)..... **B. saxicola**
- 3: Reflexed hair tufts arising from top of corolla tube
4. Leaf apex a callus tip or short innocuous mucro; corolla tube 4–6 mm long (Qld, NSW, SA, Vic)..... **B. daphnoides**
- 4: Leaf apex long-mucronate, pungent; corolla tube to 3.5 mm long
5. Sepals narrowly ovate, 2.8–3.5 mm long, about as long as corolla tube; corolla lobes 2.5–4 mm long; erect or spreading shrub to *c.* 1 m high (Tas., Vic.) **B. depressum**

- 5: Sepals ovate, 1.5–2.5 mm long, half to two-thirds the length of the corolla tube; corolla lobes 1.2–2.5 mm long; low suckering shrub rarely exceeding 30 cm high (SA, Tas., Vic.)..... **B. ciliatum**

Brachyloma stenolobum* Hislop & Cranfield, *sp. nov.

Typus: Forrestania, Western Australia [precise locality withheld for conservation reasons], 24 May 2013, M. Hislop 4255 (*holo*: PERTH 08491070; *iso*: CANB, K, MEL, NSW).

Brachyloma sp. Forrestania White (M. Hislop & F. Hort MH 2591), Western Australian Herbarium, in *FloraBase*, <http://florabase.dpaw.wa.gov.au/> [accessed October 2013].

Erect *shrubs* to *c.* 1.5 m high and 1.2 m wide, single-stemmed at ground level from a fire-sensitive rootstock. Young *branchlets* with a sparse indumentum of very short, patent hairs to *c.* 0.03 mm long. *Leaves* variably antrorse, narrowly elliptic to elliptic, 3.0–4.8 mm long, 1.3–2.0 mm wide; apex obtuse to acute with a blunt callus tip; base cuneate or rounded; petiole well-defined, 0.6–1.0 mm long, adaxial surface sparsely hairy, abaxial surface and margins glabrous; lamina 0.3–0.5 mm thick, concavo-convex to \pm plano-convex, longitudinal axis straight or gently incurved; surfaces \pm concolorous, slightly shiny; adaxial surface glabrous, apart sometimes for a few basal hairs, venation not evident; abaxial surface with 5–7 slightly raised primary veins and broad, shallow grooves between; margins glabrous or coarsely and minutely ciliolate with hairs to *c.* 0.03 mm long. *Inflorescence* erect to widely spreading, axillary; axis 0.6–1.2 mm long, 1- or occasionally 2-flowered, moderately hairy and usually terminating in a bud-like rudiment. *Fertile bract* depressed-ovate 0.5–0.7 mm long, 0.6–0.8 mm wide, subtended by 1 or 2 smaller, sterile bracts. *Bracteoles* depressed-ovate, 0.8–1.0 mm long, 1.0–1.2 mm wide, obtuse; abaxial surface glabrous, \pm striate, pale green to straw-coloured; margins ciliolate. *Sepals* broadly ovate or ovate, 1.3–1.5 mm long, 1.2–1.4 mm wide, obtuse; abaxial surface glabrous, pale green to straw-coloured, \pm striate with 7–9 slightly raised veins, becoming scarious towards the margins; adaxial surface with sparse hairs in a discrete patch towards the base; margins ciliolate with hairs 0.02–0.05 mm long. *Corolla tube* white, campanulate to shortly cylindrical, slightly exceeding the sepals, 1.2–1.6 mm long, 1.1–1.5 mm wide, glabrous, although with hairs exerted into the tube from the base of the lobes. *Corolla lobes* narrowly triangular, acute, white, thick, fleshy, longer than the tube, widely spreading from the base and gently recurved, 2.1–2.7 mm long, 0.6–0.8 mm wide at the base, glabrous externally; internal surface keeled in the upper 2/3, \pm glabrous in the upper 1/3, strongly papillate in the lower 2/3, with a narrow zone of long, reflexed hairs issuing from the base. *Anthers* partially exerted from the tube (by 1/4–1/3 of their length), 0.7–0.8 mm long, the lateral surfaces papillose, apex emarginate. *Filaments* very short, 0.1–0.2 mm long, attached just below the anther apex. *Nectary* annular, 0.25–0.35 mm long, irregularly lobed for 1/3 to 2/3 of its length. *Ovary* globose or depressed-globose, 0.4–0.6 mm long, 0.5–0.7 mm wide, minutely papillose, 3-locular. *Style* 0.25–0.40 mm long, minutely papillose, well-differentiated from ovary apex; stigma not or scarcely expanded. Mature *fruit* not seen, immature fruit depressed-globose. (Figure 1)

Diagnostic characters. The only Western Australian species of *Brachyloma* with white flowers and narrowly triangular, adaxially keeled corolla lobes.

Other specimens examined. WESTERN AUSTRALIA: [localities withheld for conservation reasons] 15 May 2002, M. Hislop & F. Hort MH 2591 (NSW, PERTH); 15 May 2002, M. Hislop & F. Hort MH 2592 (NSW, PERTH).



Figure 1. *Brachyloma stenolobum*. Photograph of flowering branchlet from M. Hislop & F. Hort MH 2592. Scale bar = 1 cm.

Distribution and habitat. Currently known only from the Forrestania area in the south-west corner of the Coolgardie bioregion (Department of the Environment 2013). The plant grows on yellow sandplain as a component of heath. Associated species include *Allocasuarina spinosissima*, *Acacia heteroneura*, *Melaleuca cordata* and *M. calyptroides*.

Phenology. The only collections of this species were made in May and these were at early- or mid-flowering stage. Peak flowering is probably dependant on the extent and pattern of the late spring to early autumn rainfall in the area and could be expected to be any time between April and June. Mature fruit has not been seen but is likely to be present at least between August and October.

Etymology. From the Greek *stenos* (narrow) and *lobos* (a lobe), a reference to the narrow corolla lobes, in comparison to other Western Australian species.

Conservation status. Listed by Smith (2013) as Priority One under Department of Parks and Wildlife Conservation Codes for Western Australian Flora, under the name *Brachyloma* sp. Forrestania White (M. Hislop & F. Hort MH 2591). The species has been collected from two sites on Unallocated Crown Land about 2.5 kilometres from each other, and it is quite possible that they are in fact from the one scattered population. At both sites it is moderately common. The natural vegetation in this part of the state is largely intact and the species' preferred habitat of heath over yellow sandplain is a common one in the general area. There must therefore be a good chance that future survey work will bring to light new populations, although the fact that the first collection was made as recently as 2002 suggests that it is unlikely to have a wide distribution.

Affinities. *Brachyloma stenolobum* has no close relatives in Western Australia and even among the eastern Australian members of sect. *Lissanthoides*, close affinities are not apparent. It is the only species in the genus in which the inflorescence axis terminates in a bud rudiment rather than a flower, and that has the reflexed hair tufts issuing from the base of the corolla lobes and not the top of the corolla tube. It is also the only species in sect. *Lissanthoides* with a standard 3-locular, rather than 5-locular, ovary.

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